DEPARTMENT OF CONSTRUCTION SCIENCE

The construction industry is the largest industry in the nation with more than 7.7 million employees who annually produce more than 5 percent of the nation's Gross Domestic Product. Managing the construction process requires a broad understanding of the principles of construction science as well as leadership skills in motivating teams and integrating a wide range of tasks to produce a completed project.

The primary mission of the Department of Construction Science is to prepare students for successful careers and future leadership roles in construction and construction-related industries. The program integrates principles of architecture, technology, engineering, business and project management preparing students to effectively manage the total construction process. Courses taught by the Department include construction materials and methods, fundamental design courses in soils and foundations, mechanical and electrical systems and structures, project control systems and management, construction law, labor and contracts, and industry emphasis courses. In addition, related courses from other colleges are included to ensure a broad base of knowledge in business, engineering and construction fundamentals.

Enrollment in Construction Science Program

1. Students must have satisfactorily completed at least 54 hours of coursework with a minimum GPR of 2.5 for those courses completed at Texas A&M University.

2. Students must satisfactorily complete the following courses as part of the 54 hours of coursework with a minimum of a 2.5 GPR to be considered to upper level:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
<td>4</td>
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<tr>
<td>or GEOL 1C</td>
<td>or Principles of Geology</td>
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<tr>
<td>or ENGR 11</td>
<td>or Energy: Resources, Utilization and Importance to Society</td>
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<tr>
<td>COSC 175</td>
<td>Construction Graphics Communication</td>
<td>3</td>
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<tr>
<td>COSC 253</td>
<td>Construction Materials and Methods I</td>
<td>3</td>
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<tr>
<td>COSC 254</td>
<td>Construction Materials and Methods II</td>
<td>3</td>
</tr>
<tr>
<td>COSC 275</td>
<td>Estimating I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210 or COMM 2</td>
<td>Technical and Business Writing or Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Finite Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Calculus</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 32

3. Students must apply for upper level through the department. The application is to be submitted the semester or summer session in which all of the above criteria are met.

- March 1 for Summer admission
- June 15 for Fall admission
- October 1 for Spring admission

Faculty

Ashburn, Benjamin S, Instructional Assistant Professor
Construction Science
MBA, Webster University, 2009

Bae, Junseo, Visiting Lecturer
Construction Science
MARC, Hanyang University, South Korea, 2011

Benham, James M, Visiting Lecturer
Construction Science
MS, Texas A&M University, 2014

Bigelow, Ben F, Assistant Professor
Construction Science
PHD, University of Colorado, 2014
MLA, Arizona State University, 2008

Boltz, Gary L, Senior Lecturer
Construction Science
BS, Texas A&M University, 1983

Bryant, John A, Associate Professor
Construction Science
PHD, Texas A&M University, 1995

Carlson, Kimberly A, Senior Lecturer
Construction Science
MARC, Texas A&M University, 2002

Choi, Kunhee, Associate Professor
Construction Science
PHD, University of California, Berkeley, 2008

Choudhury, Iftekharudd, Associate Professor
Construction Science
PHD, Texas A&M University, 1994

Daigneault, Melissa S, Visiting Lecturer
Construction Science
JD, Wake Forest University School of Law, 2003

Dixit, Manish K, Assistant Professor
Construction Science
PHD, Texas A&M University, 2013

Du, Jing, Assistant Professor
Construction Science
PHD, Michigan State University, 2012

Ellis, Debra R, Senior Lecturer
Construction Science
JD, Baylor University, 1993
Escamilla, Edelmiro E, Instructional Assistant Professor
Construction Science
PHD, Texas A&M University, 2011
MAR, Texas A&M University, 2002

Eustace, George N, Senior Lecturer
Construction Science
MA, Texas A&M University, 1977

Feigenbaum, Leslie H, Senior Lecturer
Construction Science
MS, Texas A&M University, 1985

Fernandez-Solis, Jose L, Associate Professor
Construction Science
PHD, Georgia Institute of Technology, 2006

Fickel, Larry W, Senior Lecturer
Construction Science
BS, Texas A&M University, 1981

Grisham, Ray F, Lecturer
Construction Science
JD, The University of Texas at Austin, 1972

Haque, Mohammed E, Professor
Construction Science
PHD, New Jersey Institute of Technology, 1995

Horlen, Joseph P, Associate Professor
Construction Science
JD, Baylor University, 1980

Jordan, Michael P, Lecturer
Construction Science
BS, Texas A&M University, 2005

Kang, Ho-Yeong, Associate Professor
Construction Science
PHD, Texas A&M University, 2001

Lavy, Sarel, Associate Professor
Construction Science
PHD, Technion - Israel Institute of Technology, 2006

Marraro, Anthony R, Senior Lecturer
Construction Science
MS, Texas A&M University, 1997

McGowan, Anne B, Instructional Professor
Construction Science
MS, Texas A&M University, 1976

Nichols, John M, Associate Professor
Construction Science
PHD, University of Newcastle, Australia, 2002

Rodgers, William S, Clinical Professor
Construction Science
JD, Texas Tech University, 1978

Rybkowski, Zofia K, Associate Professor
Construction Science
PHD, University of California, Berkeley, 2009

Ryoo, Boong Y, Associate Professor
Construction Science
PHD, University of Wisconsin - Madison, 1995

Whitman, John M, Visiting Lecturer
Construction Science
BS, Texas A&M University, 1989

Williamson, Kenneth C, Associate Professor
Construction Science
PHD, University of Oklahoma, 1994

Workman, Ronald L, Senior Lecturer
Construction Science
MS, Texas A&M University, 2002

**Majors**

- Bachelor of Science in Construction Science (http://catalog.tamu.edu/undergraduate/architecture/construction-science/bs)

**Minors**

- Leadership in the Design and Construction Professions Minor (http://catalog.tamu.edu/undergraduate/architecture/construction-science/leadership-design-construction-professions-minor)

**Courses**

**COSC 153 Introduction to the Construction Industry**
Credits 3.3 Lecture Hours.
Characteristics of the construction industry; types of construction companies; contracts; people involved in a project, their responsibilities and interrelationships; evolution of a project; interpreting working drawings; construction bonds; contract documents.

**COSC 175 Construction Graphics Communication**
Credits 3.3 Lecture Hours.
Visualization, interpretation and communication of graphical geometry in construction design and engineering; graphical analysis of problems; sketching applications, computer aided design, and fundamentals of information modeling software; introduction to common quantitative tools in construction.

**Prerequisite:** COSL majors only.

**COSC 202 Introduction to Housing**
Credits 3.3 Lecture Hours.
Overview of the social, economic, environmental and cultural impacts of housing on communities and nations; varied prospectives to understand the different facets of housing and their impacts on the human experience; critical thinking skills to gain knowledge and to be informed of housing choices.

**COSC 253 Construction Materials and Methods I**
Credits 3.3 Lecture Hours.
(ARCH 2312) Construction Materials and Methods I. Materials, methods and sequences of the construction process; emphasis on design, specification, purchase and use of concrete, masonry and wood.
COSC 254 Construction Materials and Methods II  
**Credits 3. 3 Lecture Hours.**  
Analysis of materials and methods used in the design and construction of buildings with a particular emphasis on structures using structural steel reinforced concrete and dimensional framing lumber.  
**Prerequisite:** COSC 253.

COSC 275 Estimating I  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Systems approach to determining required quantities of construction materials; quantification of various types of foundation systems, structural systems and building envelope systems; excerpts of contract documents from a variety of different building projects.  
**Prerequisites:** COSC 175; COSC 254.

COSC 284 Introduction to Applied Workplace Ethics, Etiquette and Communications  
**Credits 3. 3 Lecture Hours.**  
For students in an experiential learning environment; required reading assignments on topics concerning workplace ethics, etiquette and communications; apply and discuss reflective writing assignments in order to prepare to meet the professional expectations of employers upon graduation.  
**Prerequisite:** Engaged in an internship, co-op or other experiential learning opportunity working a minimum of 20 hours per week.

COSC 285 Directed Studies  
**Credits 1 to 3. 1 to 3 Other Hours.**  
Special project in construction science. Project must be approved by the department.  
**Prerequisite:** Approval of department head.

COSC 291 Research  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Research conducted under the direction of faculty member in construction science. May be repeated 2 times for credit.  
**Prerequisites:** Freshman or sophomore classification; approval of instructor.

COSC 301 Construction Surveying  
**Credits 2. 0 Lecture Hours. 4 Lab Hours.**  
Practical applications of surveying to the practice of construction project management; distance, grade and angular measurement; surveying equipment and its application to construction layout and control; surveying documentation and field work; introduction to other three dimensional measurement and positioning systems.  
**Prerequisite:** Admission to upper level in Construction Science.

COSC 310 Design and Construction Leadership Education I  
**Credit 1. 1 Lecture Hour.**  
Promotion of personal leadership skills utilized within the design and construction professions; primary understanding and developing management skills with specific attention to developing personal attributes and skills necessary for achieving organizational goals.  
**Prerequisites:** CARC majors only pursuing the minor in leadership in the design & construction professions; junior or senior classification or approval of instructor.

COSC 321 Structural Systems I  
**Credits 3. 3 Lecture Hours.**  
Introduction to the physical principles that govern classical statics and strengths of materials through the design of architectural structures.  
**Prerequisite:** Admission to upper level in Construction Science.

COSC 325 Mechanical, Electrical and Plumbing Systems in Construction I  
**Credits 3. 3 Lecture Hours.**  
Design, operation, materials and installation methods of mechanical, electrical and plumbing systems in construction.  
**Prerequisite:** Admission to upper level in construction science or minor in facility management.

COSC 326 Mechanical, Electrical and Plumbing Systems in Construction II  
**Credits 3. 3 Lecture Hours.**  
In depth coverage of mechanical, electrical and plumbing (MEP) system operations, materials and installation methods; development of MEP drawings, specifications and contract documents as used in MEP specialty contracting industry.  
**Prerequisite:** COSC 325.

COSC 333 Project Management for Facility Managers  
**Credits 3. 3 Lecture Hours.**  
Overview of project management for facility managers covering concepts and components of project management and their interrelationships in construction practice.  
**Prerequisite:** Minor in facility management; junior or senior classification or approval of instructor.

COSC 353 Construction Project Management  
**Credits 3. 3 Lecture Hours.**  
An introduction to construction project management covering concepts of project selection, estimating bidding, scheduling, subcontracting practices, cost controls, project documentation, construction bonds, insurance, payments and the elements of close out; development of professional communication skills through prepared multi-media presentations.  
**Prerequisite:** Admission to upper level in Construction Science.

COSC 364 Construction Safety I  
**Credit 1. 1 Lecture Hour.**  
Administration and application of the OSHA Act in the construction industry; includes standards, the general duty clause, competent person, and hazard identification; fulfills the requirements for the ten-hour OSHA certifications.  
**Prerequisite:** Admission to upper level in Construction Science.

COSC 375 Estimating II  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Quantification and pricing of direct field costs and general condition costs from construction documents; the preparation of complete lump sum bid package ready for project execution; complete set of contract documents required.  
**Prerequisites:** Admission to upper level in Construction Science; COSC 275.

COSC 381 Professional Ethics in the Construction Industry  
**Credit 1. 1 Lecture Hour.**  
Principles of ethical behavior in preparation for a professional internship with a construction or construction-related company; various construction company case studies emphasizing personal accountability, integrity, moral courage, individual, association and company codes of conduct; accepted business practices, decision making, company cultures, peer pressure, public opinion.  
**Prerequisite:** Admission to upper level in Construction Science.
COSC 410 Design and Construction Leadership Education II
Credit 1. 1 Lecture Hour.
Development of competencies in various leadership and management practices that are useful in an array of situations; emphasis on organizational leadership and management development with specific attention to intragroup relationships and techniques for achieving group goals.
Prerequisites: COSC 310, CARC majors only pursuing the minor in leadership in the design and construction professions; junior or senior classification or approval of instructor.

COSC 411 Seminar in Design and Construction Executive Leadership
Credit 1. 1 Lecture Hour.
Promotes an understanding of leadership and builds the capacity to understand and meet the challenges involved in developing and leading ethical and sustainable organizations in today's economy; examination of theory, conceptualizing, reflection and application; share experiences in everyday life and learn to predict outcomes based on theoretical models.
Prerequisite: COSC 410; CARC majors only pursuing the minor in leadership in the design and construction; junior or senior classification or approval of instructor.

COSC 421 Soil and Structural Analysis.
Credits 3. 3 Lecture Hours.
Advanced structural analysis of steel and concrete members with an introduction to soil properties and constituents; utilizations of computer analysis tools.
Prerequisite: COSC 321.

COSC 440 Interdisciplinary Capstone
Credits 4. 4 Lecture Hours.
A senior capstone for students preparing to enter the designbuild sector of the construction industry; integration of the design and construction processes into a single, cohesive project delivery system, starting with project inception, and carrying through construction, operation and maintenance of various types of construction projects.
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 441 Residential Capstone
Credits 4. 4 Lecture Hours.
A senior capstone course for students preparing to enter the residential construction industry; project management of residential projects, including market analysis, site analysis, residential design, building codes, estimating, scheduling, financing, subcontracting, marketing, business planning and current trends in design and construction.
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 442 Commercial Capstone
Credits 4. 4 Lecture Hours.
A senior capstone course for students preparing to enter the commercial construction sector; project management of commercial construction projects, including aspects of design, bidding/estimating; presentation, value engineering, contracts/negotiation, subcontractor relations, cost controls, management during construction, close out, and post-construction requirements.
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 443 Industrial Capstone
Credits 4. 4 Lecture Hours.
A senior capstone course for students preparing to enter the industrial construction sector; project management of industrial construction projects including project acquisition, planning and staffing, engineering, procurement, construction, start-up, close out, operations and maintenance, and turn-arounds.
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 446 Specialty Capstone
Credits 4. 4 Lecture Hours.
Senior capstone course for students preparing to enter the mechanical, electrical or other specialty construction company; project management of specialty contracts including project acquisition, schematic system design, estimating/bidding, scheduling, systems integration, value engineering, management during construction of crews and procurement, contract administration, business planning and current industry issues.
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 450 Facility Management Principles and Practices
Credits 3. 3 Lecture Hours.
Principles of facility management; the life cycle of a project; strategic planning; performance measurements; life cycle cost approach; building sustainability; maintenance management; and industry practices.
Prerequisite: Admission to upper level in construction science or minor in facility management.

COSC 459 Industrial Construction
Credits 3. 3 Lecture Hours.
Industry specific knowledge such as concepts of developing construction management strategies of industrial projects, materials and methods, structural and mechanical components; preparation to effectively resolve challenges faced in the industrial construction sector.
Prerequisites: Admission to upper level in construction science; COSC 375.

COSC 461 Building Information Modeling System
Credits 3. 3 Lecture Hours.
Exploration of a data-rich, object-oriented, and parametric digital representation of the facility, from which views and information can be extracted and analyzed for construction project acquisition, planning, and control.
Prerequisite: Admission to upper level in Construction Science.

COSC 463 Introduction to Construction Law
Credits 3. 3 Lecture Hours.
Introduction to basic contract and tort issues and their application in the construction industry; delineation of the various types of contracts and remedies available to parties involved in a construction project; additional related topics including bidding, delays, mechanics liens, site conditions, warranties and the Uniform Commercial Code as it relates to the construction industry, introduction to legal research and reasoning as used by professional constructors.
Prerequisite: Admission to upper level in Construction Science.
COSC 464 Construction Safety II
Credits 3. 3 Lecture Hours.
Administration and application of the Occupational Safety and Health Administration Act in the construction industry; includes OSHA standards, the general duty clause, competent person and hazard identification; fulfills the requirements for the thirty-hour OSHA, CPR and First Aid certifications.
Prerequisite: Admission to upper-level in construction science; COSC 364.

COSC 465 Advanced Topics in Construction Law
Credits 3. 3 Lecture Hours.
Legal issues affecting construction, including the parties to construction work, contracting, responsibilities and risk, risk management, damages, handling of claims and disputes, indemnification, bonds, insurance, bankruptcy, labor and employment, and subcontract management; litigation and alternative dispute resolution methods regularly used in the construction industry.
Prerequisite: COSC 463.

COSC 466 Risk Management in the Built Environment
Credits 3. 3 Lecture Hours.
Decision-making and risk analysis concepts in the context of the built environment and construction projects; major categories and tools of risk management regularly used in the construction industry such as contracts, insurance and bonds.
Prerequisites: Admission to upper level in construction science and COSC 463 or concurrent enrollment.

COSC 474 Facility Management Internship
Credits 3. 3 Lecture Hours.
An internship (10 weeks, 400 hours) in a facility management related position that exposes the student to facility management activities; daily logs, monthly reports, final report and completion letter required; distance education off-campus course; does not satisfy College of Architecture semester away requirement.
Prerequisites: COSC 450; approval of internship faculty coordinator.

COSC 475 Construction Project Planning
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Development of parameter cost estimates for activities that relate to the construction of a building project; work packages sequenced, planned and leveled to develop a working project execution document; development of procedures to monitor actual field progress.
Prerequisite: COSC 353, COSC 375.

COSC 477 Construction Project Controls
Credits 3. 3 Lecture Hours.
Introduction to construction related financial documents including schedule of values, labor and operations cost reports, income statements, balance sheets and construction budgets; emphasis on the development of techniques required to effectively monitor the financial aspects of a construction project.
Prerequisite: COSC 353.

COSC 481 Seminar
Credit 1. 1 Lecture Hour.
Seminar discussion of construction equipment selection, utilization maintenance and operating cost.
Prerequisite: Must be taken last full semester before graduation.

COSC 484 Internship - 10 Week
Credits 3. 3 Other Hours.
An internship (10 weeks, 400 hours) with a construction or construction-related company that exposes the student to construction-related activities; daily logs, monthly reports, final report and completion letter required; distance education course with non-resident status; does not satisfy the College of Architecture semester away requirement.
Prerequisites: COSC 364 and COSC 381; approval of internship faculty coordinator.

COSC 485 Directed Studies
Credits 1 to 5. 1 to 5 Other Hours.
Special problems in building construction.
Prerequisite: Admission to upper-level in Construction Science.

COSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of construction science. May be repeated for credit.
Prerequisite: Admission to upper level in Construction Science.

COSC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in construction science. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Admission to upper level in Construction Science and approval of instructor.

COSC 494 Internship
Credits 7. 7 Other Hours.
An internship (15 weeks, 600 hours) with a construction or construction-related company that exposes the student to construction-related activities, daily logs, monthly reports, final report and completion letter required; distance education course with non-resident status. No other TAMU courses may be taken while enrolled in COSC 494.
Prerequisites: COSC 364 and COSC 381; approval of internship faculty coordinator.